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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,293	04/01/2004	Matthew Donofrio	5308-390	8325
20792	7590	05/31/2006		
MYERS BIGEL SIBLEY & SAJOVEC PO BOX 37428 RALEIGH, NC 27627			EXAMINER CHAMBLISS, ALONZO	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

**Office Action Summary**

Application No.

10/815,293

Applicant(s)

DONOFRIO, MATTHEW

Examiner

Alonzo Chambliss

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,4-7,10-13,15,17,19,21-27,39-43,46-62 and 75 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-7,10-13,15,17,19,21-27,39-43,46-48,52-62 and 75 is/are rejected.
- 7) ☒ Claim(s) 49-51 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/30/04, 8/31/05, 10/24/05</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of claims 1, 4-7, 10-13, 15, 17, 19, 21-27, 39-43, 46-62, and 75 in the reply filed on 3/13/06 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). However, claim 19 falls under species C1, since the lenses has a curved feature as recited in claim 18.
2. Claims 2, 3, 8, 9, 14, 16, 18-20, 44, and 66-73 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted on 8/30/04, 8/31/05, and 10/24/05 was filed before the mailing date of the non-final rejection on 5/28/06. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Drawings***

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, singulation of the substrate into individual light emitting devices. Blanket annealing a surface of the substrate utilizing a laser. Etching the substrate subsequent to the removal of material

utilizing a laser. A micro mask between the mask layer and the substrate must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: " LASER PATTERNING OF LIGHT EMITTING DEVICES ".

***Claim Objections***

6. Claim 41 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 41 recites etching process and claim 39 does not recite an etching process.

7. Claim 53 is objected to because of the following informalities: the word " patterns " is misspelled in line 2. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 4, 6, 7, 39, and 42 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Eliashevich et al. (WO 02/41362).

With respect to Claims 1, 39, Eliashevich teaches shaping a surface of a semiconductor layer of the light emitting device 250 by removing material from the substrate utilizing a laser to define three dimensional geometric patterns in the layer (page 7 lines 1-21, page 17 lines 1-35, claims 1-4; Figs. 8-11).

With respect to Claims 4, 6, and 42, Eliashevich teaches wherein the semiconductor layer comprises the substrate 226 (i.e. made of sapphire) of the light-emitting device 250 (see page 7 lines 7-25 and page 17 lines 15-32).

With respect to Claim 7, Eliashevich teaches wherein shaping a surface of a semiconductor layer comprises applying laser light to the semiconductor at an energy sufficient to remove material from the semiconductor layer (see page 6 lines 18-35, page 7 lines 1-26, claims 1-4).

10. Claims 1, 4, 5, 7, 12, 13, 15, 39, and 42 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Suehiro et al. (EP 1253058).

With respect to Claims 1 and 39, Suehiro teaches shaping a surface of a semiconductor layer of the light emitting device 241 by removing material from the substrate utilizing a laser to define three dimensional geometric patterns in the layer (paragraphs 50, 51, and 64-68; Figs. 6A, 6B, 9A, 9B, 10A, and 10B).

With respect to Claims 4, 5, and 42, Suehiro teaches wherein the semiconductor layer comprise the substrate 242 (i.e. made of silicon carbide) of the light emitting device 241 (see paragraph 68).

With respect to Claim 7, Suehiro teaches wherein shaping a surface of a semiconductor layer comprises applying laser light to the semiconductor at an energy sufficient to remove material from the semiconductor layer (see paragraphs 64-66).

With respect to Claim 12, Suehiro teaches wherein a plurality of geometric pattern are provided in the surface of the semiconductor layer, wherein the geometric

patterns extending into the semiconductor layer and having uninterrupted perimeters at a same level of the semiconductor layer (see Figs. 9A, 9B, 10A, and 10B).

With respect to Claim 13, Suehiro teaches wherein the surface of the substrate is on a side of the substrate opposite the light emitting element (see Figs. 9A, 9B, 10A, and 10B).

With respect to Claim 15, Suehiro teaches shaping a surface of the semiconductor layer precedes singulation of the substrate into individual light emitting devices (see paragraph 67-69; Figs. 9A, 9B, 10A, 10B, and 19).

With respect to Claim 43, Suehiro teaches forming a light emitting element on the microelectronic substrate (see Figs. 9B and 10B).

### ***Claim Rejections - 35 USC § 103***

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 10, 11, 17, and 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eliashevich et al. (WO 02/41362) as applied to claim 1 above, and further in view of Boehlen et al. (Laser Micro-machining article).

With respect to Claims 10, 11, 22-24, Eliashevich discloses the claimed invention except for applying laser light to the layer using mask projection optics that applies the light in a predefined polymer mask pattern to the layer using a laser to remove mask material. Stepping the mask pattern to different regions of the semiconductor layer to provide a plurality of the three dimensional geometric patterns. However, Boehlen discloses applying laser light to the layer using mask projection optics that applies the light in a predefined polymer mask pattern to the layer using a laser to remove mask material. Stepping the mask pattern to different regions of the layer to provide a plurality of the three dimensional geometric patterns (see paragraphs 2.1, 2.2, 2.2.1; Figs. 1-3). Thus, Eliashevich and Boehlen have substantially the same environment of a three dimensional geometric patterns in a layer in an optical device. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating a mask pattern to form the three dimensional geometric patterns in Eliashevich, since the mask pattern would improve the accuracy and speed when creating the 3D patterns as taught by Boehlen.

With respect to Claim 11, Boehlen discloses a laser light comprises light from an excimer laser operating at about 308nm (see paragraph 2.2).

With respect to Claims 17 and 21, Eliashevich discloses the claimed invention except for the plurality of geometric pattern including a plurality of different geometric



patterns (i.e. randomization features). It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape, since changing the shape of the structure is an obvious matter of design choice within ordinary skill in the art and the difference in shape of the structure does not make the device operating differently. In re Peters , 723 F.2d 891, 221 USPQ 952 (Fed. Cir. 1983). Furthermore, it is noted that in the instant specification does not describe different geometric patterns as essential or critical or the only shape that could operate the claimed invention.

With respect to Claim 25, Boehlen discloses patterning a master template with a laser and embossing the mask layer using the master template (see Fig. 1).

With respect to Claim 26, the combination of Eliashevich and Boehlen discloses wherein forming the light emitting element of Eliashevich (see Figs. 6A and 6B) is carried out subsequent to shaping the surface of the substrate in Boehlen (see Figs. 1 and 2).

13. Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suehiro et al. (EP 1263058) as applied to claim 39 above, and further in view of Collins (US 6,393,685).

With respect to Claims 40 and 41, Suehiro discloses the claimed invention except for etching (i.e. anisotropic) the substrate subsequent to the removal of material utilizing a laser. However, Collins discloses etching (i.e. anisotropic) the substrate subsequent to the removal of material utilizing a laser (see col. 10 lines 19-30). Thus, Suehiro and Collins have substantially the same environment of removing material from

a substrate utilizing a laser. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating an anisotropic etch with the process of Suehiro, since the anisotropic etch would facilitate the shaping of three-dimensional pattern in the substrate as taught by Collins.

14. Claims 46-48 and 52-59, 61, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boehlen et al. (Laser Micro-machining article) in view of Suehiro et al. (EP 1263058).

With respect to Claims 46, 47, 54, and 56, Boehlen discloses patterning a mask layer (i.e. made of polymer) on a substrate using a laser and etching the substrate using the patterned mask layer to define the three dimensional geometric patterns by removing material from the mask layer. Boehlen teaches blanket annealing a surface of the substrate (i.e. work piece) utilizing a laser to define three-dimensional features in the substrate (see paragraphs 2.1, 2.2, 2.2.1; Figs. 1-3). Boehlen fails to explicitly disclose the substrate made of silicon carbide. However, Suehiro discloses a substrate made of silicon carbide (see paragraphs 60-64). Thus, Boehlen and Suehiro have substantially the same environment of a three dimensional geometric patterns in a semiconductor layer in an optical device. Therefore, one skilled in the art at the time of the invention would readily recognize substitute a silicon carbide substrate for the substrate of Boehlen, since the silicon carbide substrate provides a stable material for a substrate when creating three dimensional geometric patterns as taught by Suehiro.

With respect to Claims 48 and 58, Suehiro discloses forming a light emitting element 244 on the surface of the opposite the surface of the three dimensional features in the substrate (see Figs. 9B and 10B).

With respect to Claims 52, 53, and 62 Boehlen discloses a single etch and in a single patterning of the mask layer. Suehiro discloses three dimensional geometric shaped but fails to disclose the plurality of geometric pattern including a plurality of different geometric patterns (i.e. randomization features). It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the different geometric patterns for the triangular shape, since changing the shape of the structure is an obvious matter of design choice within ordinary skill in the art and the difference in shape of the structure does not make the device operating differently. In re Peters , 723 F.2d 891, 221 USPQ 952 (Fed. Cir. 1983). Furthermore, it is noted that in the instant specification does not describe different geometric patterns as essential or critical or the only shape that could operate the claimed invention.

With respect to Claim 55, Boehlen discloses patterning a master template with a laser and embossing the mask layer using the mater template (see paragraphs 2.1, 2.2, 2.2.1; Figs. 1-3).

With respect to Claim 57, Boehlen teaches wherein blanket annealing a surface of the substrate comprises applying laser light to the substrate at an energy below an ablation threshold of the substrate, since the laser light does not cut completely through the substrate (see paragraphs 2.1, 2.2, 2.2.1; Figs. 1-3).

With respect to Claim 61, Boehlen teaches blanket annealing a first region of the substrate and then blanket annealing a second region of the substrate, different from the first region of the substrate (see paragraphs 2.1, 2.2, 2.2.1; Figs. 1-3).

15. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boehlen et al. (Laser Micro-machining article) as applied to claim 56 above, and further in view of Eliashevich et al. (WO 02/41362).

With respect to Claim 60, Boehlen fails to disclose a sapphire substrate. However, Eliashevich discloses a sapphire substrate (see page 7 lines 7-25). Thus, Boehlen and Suehiro have substantially the same environment of a three dimensional geometric patterns in a semiconductor layer in an optical device. Therefore, one skilled in the art at the time of the invention would readily recognize substitute a sapphire substrate for the substrate of Boehlen, since the sapphire substrate provides a stable material for a substrate when creating three-dimensional geometric patterns as taught by Suehiro.

16. Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suehiro et al. (EP 1263058) as applied to claim 1 above, and further in view of Boehlen et al. (Laser Micro-machining article).

With respect to Claim 75, Suehiro discloses the claimed invention except for shaping a surface of a semiconductor layer of the light-emitting device utilizing a laser comprises blanket annealing the surface utilizing a laser to define three-dimensional features in the layer. However, Boehlen discloses wherein shaping a surface of a layer of the light emitting device utilizing a laser comprises blanket annealing the surface

utilizing a laser to define three dimensional features in the layer (see paragraphs 2.1, 2.2, 2.2.1; Figs. 1-3). Thus, Suehiro and Boehlen have substantially the same environment of a three dimensional geometric patterns in a layer in an optical device. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating a blanket annealing process to form the three dimensional geometric patterns in Suehiro, since the blanket annealing process would improve the accuracy and speed when creating the 3D patterns as taught by Boehlen.

***Allowable Subject Matter***

17. Claim 49-51 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowance subject matter: the prior art of record does not teach or suggest the combination of a shape of the pattern of the mask layer is based on a difference between an etch rate of the silicon carbide substrate and an etch rate of the mask layer in claim 49.

Forming a micro-mask between the mask layer and the silicon carbide substrate, wherein the micro-mask being configured to roughen a surface of the substrate during etching in claim 50.

The prior art made of record and not relied upon is cited primarily to show the process of the instant invention.


### Conclusion

18. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (571) 272-1927.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system Status information for published applications may be obtained from either Private PMR or Public PMR. Status information for unpublished applications is available through Private PMR only. For more information about the PMR system see <http://pair-dkect.uspto.gov>. Should you have questions on access to the Private PMR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or [EBC\\_Support@uspto.gov](mailto:EBC_Support@uspto.gov).

AC/May 28, 2006

A handwritten signature in black ink, appearing to read 'Alonzo Chambliss', is written over a horizontal line.

Alonzo Chambliss  
Primary Patent Examiner  
Art Unit 2814